Every day we make choices. When we make a choice we are evaluating what the benefits and costs are to each decision. We are calculating how likely it is that we will achieve the outcome that we want or how likely it is that we will have to experience the negative consequences of our actions.

**Probability** is a mathematical calculation that tells us how likely it is that something will (or will not) happen. We calculate probabilities in our heads everyday whenever we make a decision. Why would we need a number to tell us what we should and shouldn’t do?

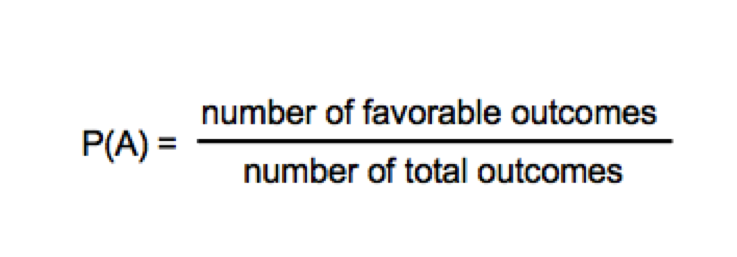
Having a number to back up our decisions is often essential in the real world. Take a look at the following examples:

Example 1: You are coordinating President Obama’s next campaign for president. You have $200,000 to spend on resources to gain voters in either New York or Texas. Voters will be voting for Obama, against Obama, or are undecided about for whom they will vote. You want to spend the money in an area where the voters are undecided about who they will vote for. Would you want to present your idea about where to spend the money to Obama based on your team’s thoughts about the voters in New York and Texas or would you want to present him with numbers and data about how likely voters are to be undecided in each state? Which would be more convincing?

Example 2: You own a basketball team and you are considering acquiring a new player and getting rid of an old player. Before you spend millions of dollars on your new player, you will first want to calculate how likely your old player is to win games and compare it to how likely the new player is to win games. This will help you to decide whether you should keep your old player or get rid of him and bring in the new player.

**How do we calculate probability?**

Probability is written as a fraction:



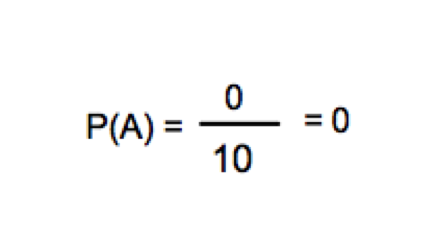
*Reminder!* Fractions can also be written as decimals (by dividing the numerator by the denominator) and that decimal can be turned into a percent (by multiplying it by 100), so sometimes you will see probabilities written as decimals and percents, but they all mean the same thing/have the same value.

**What is a "favorable" outcome?** A favorable outcome is considered whatever we are looking for the probability of.

*Example:* If we were looking for the probability of a basketball player making a free throw, the favorable outcome would be "making a free throw." On the other hand, if we were looking for the probability of a basketball player missing a free throw, the favorable outcome would be "missing a free throw."

**How do we find probability?** We find probability by adding up the total number of favorable outcomes in a situation and adding up the total number of outcomes (favorable and unfavorable). Then, we write the probability as a fraction as shown above.

*Important Fact:* The least number of favorable outcomes that we could ever have in a problem is 0. The highest number of favorable outcomes we could possibly have is ALL of our outcomes. Let's say we are finding the probability of an event with 10 possible outcomes. If none of the outcomes were favorable outcomes, our probability would be:



If ALL of the outcomes are favorable, our probability would be:

P(A) = 10/10 = 1

This means that **EVERY probability is between 0 (no chance of it occurring) and 1 (will always occur).**

**Using the information you read above, answer the following questions. Email your completed assignment to** [**teganolympus@gmail.com**](mailto:teganolympus@gmail.com)**.**

1. What are two pieces of information we need to know in order to calculate the probability of something happening?
2. What is the probability of an event that could never happen?
3. What is the probability of an event that is guaranteed to happen (always happens)?
4. Choose one other concept you’ve learned about that is related to probability in some way. Explain how these two concepts are related.
5. In your opinion, is probability useful in real life? Why or why not?